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The Gold Market at the Paris Stock Exchange: A Risk-Return Analysis 1950-2003

*Thi Hong Van Hoang**

Abstract: »*Der Goldmarkt an der Pariser Börse: Eine Rendite-Risiko-Analyse 1950-2003*«. This paper aims to study the return of investment in gold assets quoted at the Paris stock exchange during 54 years, from 1950 to 2003. Contrarily to what is thought about this mythical metal, its risk-return is very inferior to other financial assets (stocks and bonds). While it has a high degree of risk, its return is less than that of the risk-free asset. Moreover for individual investors, investment in gold has given a very low result in real terms. A capital of 100 new francs invested in the gold coin napoleon in December 1949 would have been liquidated for 56 new francs in December 2003. So its real rate of return was -1% per year.

Keywords: Paris gold market, risk-return, purchasing power.

Introduction

Gold is a precious and mythical metal, which has always presented many facets. During the 19th and the 20th centuries, it assumed three roles: metal, money and financial asset. Since the announcement by American President Nixon on August 15th, 1971 of the end of the convertibility between gold and the American dollar, gold has lost its international monetary role and has reinforced its role as financial asset.

Contrarily to the International Monetary Fund (IMF) rules during the period of Bretton-Woods fixed rate exchange regime, France opened an official gold market at the Paris Stock Exchange on February 13th, 1948. Trade in gold became free again after a prohibition period since 1939. But the permitted transactions were only internal, imports and exports were forbidden. At the opening of this market, trades in gold were anonymous and were not taxed. In January 1977, a tax applying on gold sales was introduced at a rate of 4% that was successively increased to the present level of 7.5% (with 0.5% of commission costs, the total charge becomes 8%). The main gold assets quoted at the Paris Stock Exchange were the bar (12 kilos), the ingot (1 kilo) and many coins among which the most popular and the most traded was the 20 francs coin, called "*napoléon*".

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In July 2004, *Euronext Paris* announced the end of the gold market at the Paris Stock Exchange because of the fading away of participants.

This paper about this particular market aims to answer three principal questions:

- 1) How did this market work and how did it evolve?
- 2) What has been the risk-return trade-off of the gold assets?
- 3) Why has this market been closed in July 2004?

With these objectives, the paper is structured as follows.

A first section presents the essential points of the functioning of this market. A second section describes the database and the evolution of the market. A third section shows the risk-return trade-off of the gold assets in comparison with stocks and bonds quoted at the Paris Stock Exchange. A fourth section answers the question about the evolution of the purchasing power of gold investments. Finally, it is concluded with explanations of the reasons for which Paris's gold market has been closed in July 2004.

The functioning of the gold market at the Paris Stock Exchange

The opening of an official gold market in France was authorized by the law¹ of February 2nd, 1948. Holding, trade and circulation of gold became free again after a ten-year prohibition period which started with the Second World War in 1939. But exchanges with foreign markets were forbidden. Transactions were anonymous and were not taxed. The gold market was officially opened on February 13th, 1948 in the *Palais Brongniart* under the authority of "*La Chambre Syndicale des Agents de Change*".

The gold assets were traded on a special pit, called "*corbeille*"². Contrarily to the case of stocks and bonds, the traders on the pit were not only stockbrokers (*agents de change*) but also representatives of banks or financial institutions especially authorized by "*La Chambre Syndicale des Agents de Change*".

The technique of quotation was the usual one at the Paris Stock Exchange: an open outcry for a fixing taking place from 12.30 pm to 1.30 pm³. The quotes (first, highest, lowest and last) were published in the official "*Bulletin de la Cote*" published by "*La Chambre Syndicale des Agents de Change*". These quotes have followed the changes of the France's monetary units: from 1948 to 1959 in "old francs"; from 1960 to 1998 in "new francs"; since January 1999 in euros. Contrarily to the London gold market, the most important gold market in

¹ Law of February 2nd, 1948 in "*Journal Officiel*", source: Archives of Bank of France.

² Cf. Rules of Gold Market at the Paris Stock Exchange edited by "*La Chambre Syndicale des Agents de Change*", source: Archives of Bank of France.

³ This schedule was changed over the time.

the world, quotation at Paris Stock Exchange was not in ounce⁴ but in kilo (for bars and ingots) and coins were transacted by unit⁵.

This was a *cash* market. Payments and delivery were taking place on the following day. The advantage of this regulated market was the existence of strict rules (contrarily to the vagueness during the 19th century⁶) insuring the quality and the weight of the traded gold assets⁷.

Table 1 below presents the main gold assets that were traded. The most traded assets were the gold ingot (1 kg, mostly for wealthy investors) and the 20 francs gold coin called “*napoléon*”⁸ (6.4 grams with 5.8 grams of fine gold, for small investors). Bars of 12 kg were also quoted but less regularly (because of its very high value). The English coins, “*sovereign*”, are those stamped since the Monetary Law of June 22nd, 1816. Coins from the Latin Union (stamped in Austria, Hungary, Belgium, Bulgaria, Greece, Italy, Monaco, Romania, Russia, Sardinia, Serbia) were also quoted.

From 1948 to 2004, three important legal events have had a very strong influence on the market behavior.

First, on January 31st, 1967, the prohibition of gold trading with foreign markets was removed⁹. The objective was to induce foreigners to trade in Paris. Unluckily, this aim was not attained because foreign investors preferred to trade on other markets like London or Zurich. The trade volume on bars of international specification was so small that this “*opened market*” could not be maintained any more. Finally, in December 1968, the prohibition to trade gold with foreigners was re-instituted¹⁰.

The second important event has been the taxation. For 29 years (from 1948 to 1976), gold holding has been the unique financial asset to avoid all taxes. This “*fiscal paradise*” ended in January 1977 when a 4% tax on all sale values was introduced. It had an overwhelming effect on the market since the transactions dropped by 124% during the first 1977 quarter compared to the same one of 1976. As usual, when a tax is introduced, its trend is the increase in rates, as the following table shows.

⁴ 1 ounce = 31,10348 grams.

⁵ Coins usually include a premium over their metal value. (Cf. Section 2).

⁶ Cf. Boyer-Xambeu, Deleplace and Gillard (2007).

⁷ For details on these rules, see “Rules of Gold Market at Paris Stock Exchange”, *loc. cit.* Source: Archives of Bank of France.

⁸ Contrarily to its name “*napoléon*”, this coin has been stamped during all the 19th and 20th centuries.

⁹ Law of December 28th, 1966 in “*Journal Officiel*”, source: Archives of Bank of France.

¹⁰ Decree of May 29th, 1968 in “*Journal Officiel*”, source: Archives of Bank of France.

Table 1: Main gold assets quoted at the Paris Stock Exchange

Definition	Current Appellation	Content of fine gold in grammes or title
Bar (12 kg)		900/1000
		916/1000
		995/1000
<i>Ingot (1 kg)</i>		<i>995/1000</i>
<i>French coins (20 francs)</i>	<i>Napoleon or Louis</i>	<i>5.80645</i>
French coins (10 francs)	Half-napoleon	2.90322
Swiss coins (20 francs)	Vreneli	5.80645
Latin Union coins		5.80645
<i>English coins (£20)</i>	<i>Sovereign</i>	<i>7.3224</i>
English coins (£10)	Half-Sovereign	3.6612
American coins (\$20)	Double-Eagle	30.0926
American coins (\$10)	Eagle	15.0463

Table 2: French fiscal regime on sales of gold

Date	Inclusive tax on gold sales
1st July 1977	4%
21st January 1981	6%
1st January 1985	6.5%
1st January 1986	7%
1st January 1992	7.5%

Thirdly, in the same objective of taxation, the anonymity of transactions was suppressed with the decree¹¹ of September 30th, 1981. This decree obliges any person who makes any transaction on gold to record its identity in a register. This makes tax control much easier and effective. It resulted in a further drop in transactions volume: 61% during the last 1981 quarter compared to the third one of the same year. In order to prevent a total collapse of the market, anonymity was reintroduced when the Right Wing won the elections in 1986¹².

¹¹ Decree of September 30th, 1981 in “*Journal Officiel*”, source: Archives of Bank of France.

¹² Decree of May 21st, 1986 in “*Journal Officiel*”, source: Archives of Bank of France.

The uneven evolution of the Paris Stock Exchange Gold Market, from 1950 to 2003

Data

To our knowledge, there was no exhaustive database on this subject. So, we collected information from the press, pamphlets and archives bearing on the 56 years of existence of the Paris gold market. The data collected and its sources are presented in Appendix 1.

This database¹³ contains the end-of-month quotes of the four main gold assets quoted at the Paris Stock Exchange (bar, ingot, “napoleon” and “sovereign” coins); the values of indices of French stocks and bonds and the short-term rate of interest¹⁴.

The time period analyzed starts in December 1949 (almost two years after the opening of the market) because this date is the beginning of the indices that are needed for comparison and references. It terminates in December 2003 because the conventional yearly measure is used while the market was closed effectively in July 2004. Nominal quotes are transformed in indices to have the same base of 100 on December 1949 for all series.

The 1950-2003 uneven evolution of the gold market at the Paris Stock Exchange

The Figure 1 (next page) presents the evolution of the two main gold assets (ingot and napoleon) quoted at the Paris Stock Exchange¹⁵. It shows two facts of which the first is very unusual because it is an *artifact*. It looks as if the four main gold assets follow the same pattern. But this is not at all confirmed by the measures presented in Table 3 below.

¹³ The author wishes to heavily thank the members of the “*Services des Archives*” at the Bank of France for their help and advices which ensured the success of this painful data collection.

¹⁴ This hand-made database contains approximately more than 6000 observations.

¹⁵ We would have liked to present the evolution of the two other assets (bar and sovereign). But, on the graph, the four evolutions are too similar and are not distinguishable between them even if the “landscape” format is used.

Table 3: Measures of correlation between the monthly returns of the four main gold assets from 1950 to 2003

Between	Correlation coefficient	R ²
Bar-Ingot	0.98	0.96
Bar-Napoleon	0.74	0.56
Bar-Sovereign	0.77	0.60
Ingot-Napoleon	0.76	0.57
Ingot-Sovereign	0.78	0.61
Napoleon-Sovereign	0.73	0.53

Undoubtedly, with an R-square of 0.96, the bar and the ingot have the same behavior, which reflects the forces of supply and demand for “pure” gold. On the other hand, the returns of the bar and ingot are quite different from those of the coins with a R-square almost divided by two. The reason is well-known by practitioners: the gold *coins* have a value different from that of their real fine gold weight (as measured by the price of ingot) because of the extrinsic quality of the coin and the beauty of the stamped figure. This phenomenon is called the “*premium*” (“*la prime*” in French).

The unexpected small relationship between napoleons and sovereigns (R-square=0.53) is due to the fact that since the first petroleum shock, their two behaviors have been quite different. Especially during two periods: from March 1974 to March 1979 and from December 1979 to June 1983 when the napoleon’s returns fluctuated much more than the sovereign ones. In spite of the lack of data on transactions, one may suppose that most of the trades involved the napoleon coins.

Second learning of the Figure 1: it shows clearly three distinct sub-periods of which the monthly return parameters are presented in Table 4 (next page).

The first period from 1950 to August 1971 could be qualified as “*pre-petroleum shocks*”. The Paris gold market was quite stable during this period. The second period is the “*two-petroleum shocks*” from September 1971 to September 1981. The returns and the level of risk have been stupendous: around 30% for the annualized returns and 25% for the annualized risk. Another important reason for this gold market increase was the announcement of American President Nixon of the end of the convertibility between gold and dollar on August 15th, 1971. So, gold became a free merchandise liker any other. The third period is characterized by a “*lengthy decline*” from October 1981 to December 1992 (decrease by 58% for napoleon coins) and then by twelve years of stability (the napoleon index was 1021 at the end of July 1993 and was 926 in December 2003). Although this period has been full of political and economic events, the gold market did not really respond to them. It seems that, at least, it has lost its image of “*safety-asset*”. One may wonder if this is

not linked to the coming of a new generation of investors who were born after WWII.

As it is important to statistically prove that these “obvious” sub-periods are not an *artifact*, the usual tests comparing first the variances (as risk measure), then average return of the different sub-periods were performed (Table 5 below). The basic result is that the sub-period 2 is distinctly different from the two others. The difference between sub-periods 1 and 3 is less clear cut. Curiously, the bar and the ingot have had a different risk level but it is not the case for the napoleon and the sovereign. On the other hand, their average returns have all been statistically different between these two sub-periods 1 and 3.

Table 4: Risk-return for the whole period and the three sub-periods

	<i>Periods</i>	<i>Gold Assets</i>	Monthly values		Annualized results	
			<i>Average return</i>	<i>Risk</i>	<i>Average return</i>	<i>Risk</i>
	<i>Whole period</i>		In %	In %	In %	In %
	12/1949-12/2003	Bar	0.50	4.82	5.95	16.70
		Ingot	0.49	4.70	5.87	16.26
		Napoleon	0.46	4.87	5.48	16.86
		Sovereign	0.47	4.80	5.69	16.61
1	<i>Sub-period 1</i>					
	12/1949-08/1971	Bar	0.12	3.04	1.43	10.52
		Ingot	0.12	2.97	1.44	10.30
		Napoleon	0.21	3.61	2.47	12.49
		Sovereign	0.19	3.82	2.26	13.25
2	<i>Sub-period 2</i>					
	09/1971-09/1981	Bar	2.43	7.47	29.14	25.89
		Ingot	2.42	7.26	29.00	25.15
		Napoleon	2.56	7.78	30.71	26.96
		Sovereign	2.39	7.50	28.63	25.99
3	<i>Sub-period 3</i>					
	10/1981-12/2003	Bar	-0.01	4.50	-0.16	15.58
		Ingot	-0.02	4.38	-0.30	15.16
		Napoleon	-0.25	3.88	-3.01	13.45
		Sovereign	-0.11	3.77	-1.35	13.06

The computations are made on *monthly* returns. For a better understanding of the values obtained, the results are annualized: annualized return=monthly return*12; annualized risk = monthly standard-deviation* $\sqrt{12}$.

Figure 1: Evolution of the gold market at the Paris Stock Exchange, from 1950 to 2003 (Base of 100 in December 1949)

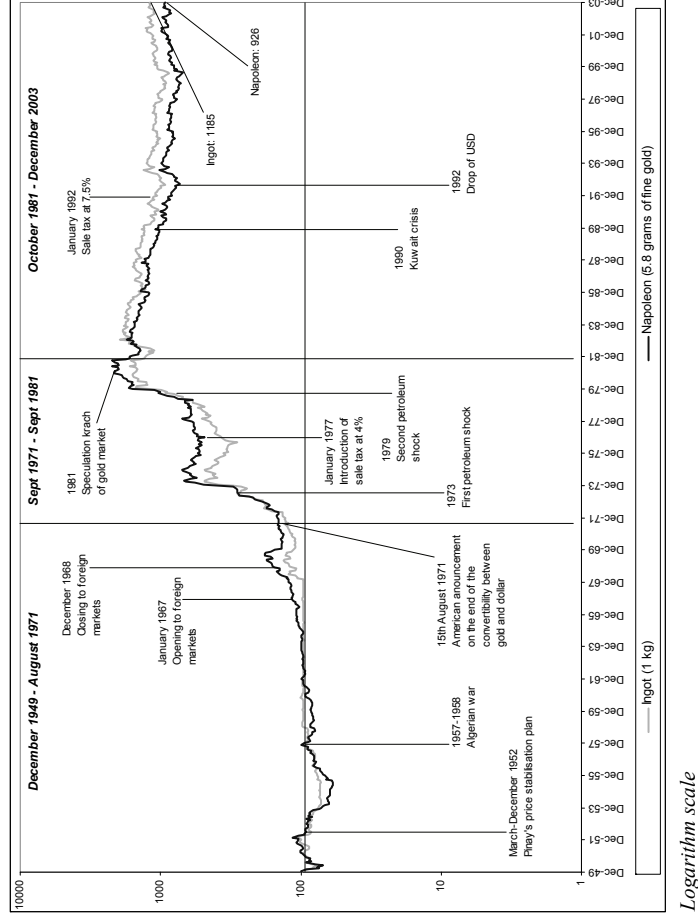


Table 5: Statistical comparisons of the risk-return parameters between the sub-periods

		Variance (Fisher test)		Average return	
		F-test value	Yes/No	Test value	Yes/No
Gold assets	Bar				
	sub-periods (1) vs (2)	6.06***	Yes	-3.27***	Yes
	sub-periods (1) vs (3)	2.19***	Yes	0.4	No
	sub-periods (2) vs (3)	2.76***	Yes	3.33***	Yes
Ingot	sub-periods (1) vs (2)	5.96***	Yes	-3.35***	Yes
	sub-periods (1) vs (3)	2.17***	Yes	0.44	No
	sub-periods (2) vs (3)	2.75***	Yes	3.43***	Yes
Napoleon	sub-periods (1) vs (2)	4.65***	Yes	-3.17***	Yes
	sub-periods (1) vs (3)	1.16	No	1.4	No
	sub-periods (2) vs (3)	4.02***	Yes	3.77***	Yes
Sovereign	sub-periods (1) vs (2)	3.85***	Yes	-3.04***	Yes
	sub-periods (1) vs (3)	1.03	No	0.91	No
	sub-periods (2) vs (3)	3.96***	Yes	3.47***	Yes

Yes: Different – No: Not different; ***: Hypothesis of equality is rejected at 1%; Note: if the variances are statistically different according to the Fisher test, the *Satterthwaite* test is used for comparing the average return. If not, the *Pooled* test is used (tests realized with SAS software).

The poor risk-return of the gold investment at the Paris Stock Exchange

To measure the profitability of investing in an asset, its annual income and fiscal situation have to be taken into account. So, the “*return indices*” for French stocks and French bonds are used. For the period from 1949 to 1992, the data were constructed by Gallais-Hamonno and Arbulu. For the period from 1993 to 2003, they were collected from the *Monthly Bulletin of Statistics* (BMS) published by Insee. The annual incomes of these two assets (dividends for stocks and coupons for bonds) include also the tax credits¹⁶. As anyone knows, gold assets do not give any annual income. The Figure 2 below shows the three nominal evolutions: napoleon¹⁷, stock and bond indices with rein-

¹⁶ There are two kinds of tax credits: for stocks, “*avoir fiscal*”; for bonds, “*crédit d’impôt*”. The “*crédit d’impôt*” has been suppressed for all bonds issued after 1987. For more details, see Gallais-Hamonno and Arbulu (1995). The sale tax is not taken into account in the following computations.

¹⁷ The same problem as explained in the footnote 16 did again arise: the evolution of the ingot (ending at 1185) and the napoleon (ending at 926) has been too similar and too close for being distinguishable on the graph. Consequently, only the napoleon is shown.

vestment of annual incomes (return indices) and the consumption price index (CPI).

The statistical parameters of the Paris financial assets

Contrarily to the previous section which only focuses on the gold assets, the present objective is to compare these former assets with stocks and bonds, taking into account the fact that these latter assets distribute incomes while gold assets do not.

The technical parameters of the four assets (ingot, napoleon, stocks and bonds) are presented in the following table and figures.

For the whole period

The analysis of Table 6 and Figure 3 shows that gold presents a low rate of return with a high level of risk in comparison with stocks and bonds. Figure 3 shows that gold was two times less profitable than bonds (about 5%/annum for gold assets and 10%/annum for bonds). But gold was four times more volatile than bonds (about 16%/annum for gold assets and 4%/annum for bonds). On the other hand, gold has the same level of risk as stocks (about 16%/annum) but gold's return is almost three times less important than that of stocks (about 5%/annum for gold assets and 14%/annum for stocks). The conclusion is that investments in gold, as a financial asset, at the Paris Stock Exchange have represented a bad risk-return for the period from December 1949 to December 2003.

The return distributions of these four assets have two usual characteristics. They are asymmetric since their skewness is different from 0; they have leptokurtic distribution with a kurtosis different from 3. So this makes distributions non-normal according to the Jarque-Bera tests. The only remarkable result is that ingots and napoleons had a positive Skewness, meaning that they had a larger probability to achieve a nominal return slightly more important than their average one. Moreover, napoleons had a very strong excess of kurtosis that reflected the extreme values obtained between 1971 and 1981.

An interesting fact does emerge: the very low correlation between stocks and gold assets (-1% with napoleons and 6% with ingots). These two assets reacted differently to social, political and economical events. This is certainly due to the role of "*safety*" assets of gold. When the stock market developed rapidly from 1990 onwards, gold seemed much less attractive and investors realized arbitrages. This fact seemed to be the only positive feature of the gold assets since it means some possibilities for diversifying stocks portfolios (which has to be studied in another study).

Figure 2: Evolution of the monthly nominal return indices of stocks and bonds, of napoleon and of consumption prices (CPI)
(Base of 100 on December 1949)

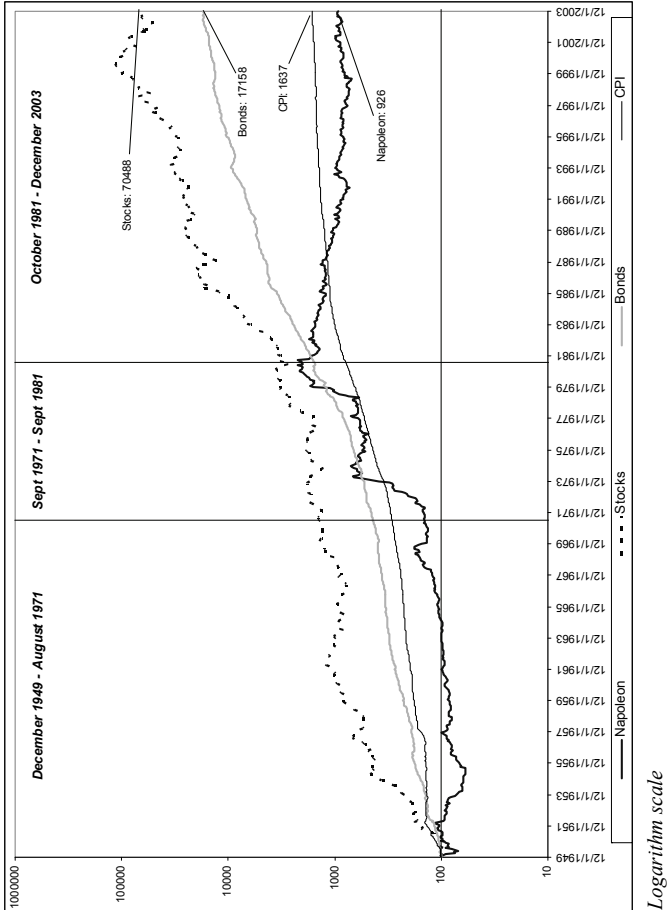
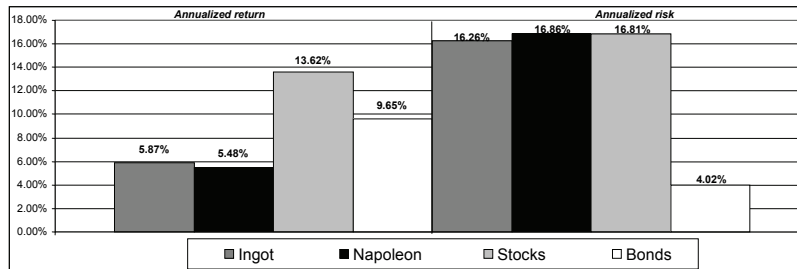


Table 6: Distribution parameters of monthly nominal returns of gold assets, stocks and bonds during the whole period and sub-periods

Assets	Average (in %)	Standard-Deviation (in %)	Skewness	Kurtosis	Jarque-Bera
Whole period: 1950-2003					
Gold	<i>Annualized</i>	<i>Annualized</i>			
Ingot	5.87	16.26	1.5***	5.26***	No***
Napoleon	5.48	16.86	1.85***	13.69***	No***
Stocks	13.62	16.81	0.28***	0.93***	No***
Bonds	9.65	4.02	0.40***	2.80***	No***
3 sub-periods					
Sub-period 1: 01/1950-08/1971					
Gold	<i>Annualized</i>	<i>Annualized</i>			
Ingot	1.44	10.30	0.32**	4.94***	No***
Napoleon	2.47	12.49	-0.24	5.32***	No***
Stocks	13.31	14.43	0.12	0.07	Yes
Bonds	6.96	3.18	0.77***	6.05***	No***
Sub-period 2: 09/1971-09/1981					
Gold	<i>Annualized</i>	<i>Annualized</i>			
Ingot	29.00	25.15	0.70***	1.41***	No***
Napoleon	30.71	26.96	1.82***	6.86***	No***
Stocks	10.27	17.35	0.06	1.11**	No**
Bonds	12.83	5.00	0.13	3.52***	No***
Sub-period 3: 10/1981-12/2003					
Gold	<i>Annualized</i>	<i>Annualized</i>			
Ingot	-0.30	15.16	0.41***	3.48***	No***
Napoleon	-3.01	13.45	0.21	4.47***	No***
Stocks	15.43	18.65	-0.58***	0.98***	No***
Bonds	10.82	4.13	0.08	0.27	Yes

The computations are made on monthly returns. For a better understanding of the values obtained, the results on average and on standard-deviation are annualized: annualized return=monthly return*12; annualized risk=monthly standard-deviation* $\sqrt{12}$; ***: significantly different from 0 at 1%; **: at 5%; *: at 10%; Kurtosis=Excess of Kurtosis from 3. For the test of Jarque-Bera: ***: normality hypothesis rejected at 1%, **: at 5%, *: at 1%.

Figure 3: Comparison of the nominal risk-return of gold assets, stocks and bonds during the whole period, from 1950 to 2003

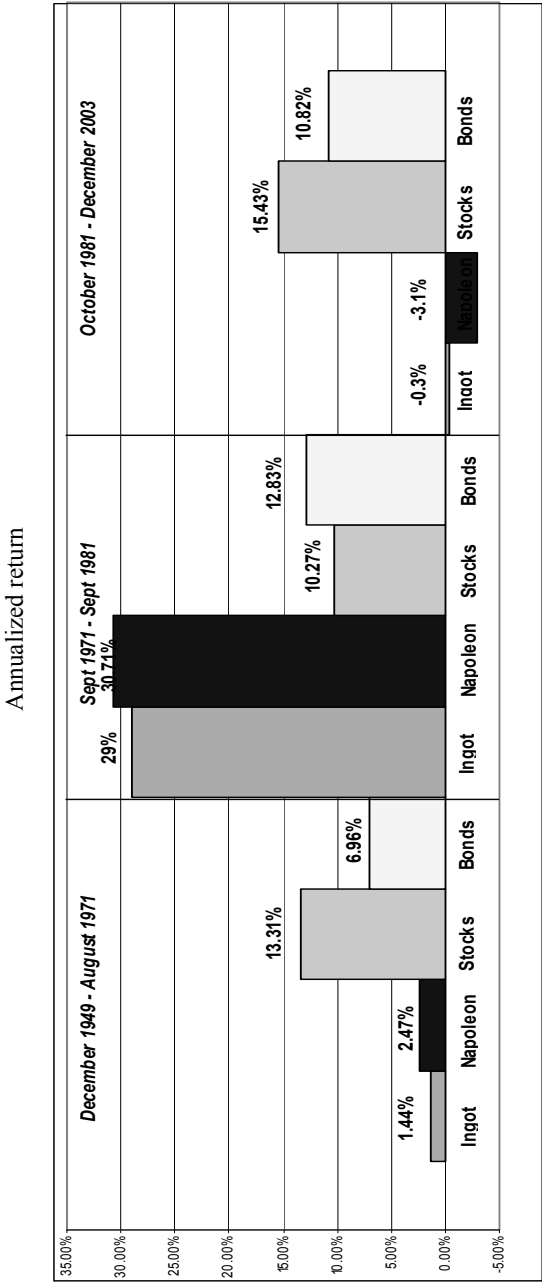


For the sub-periods

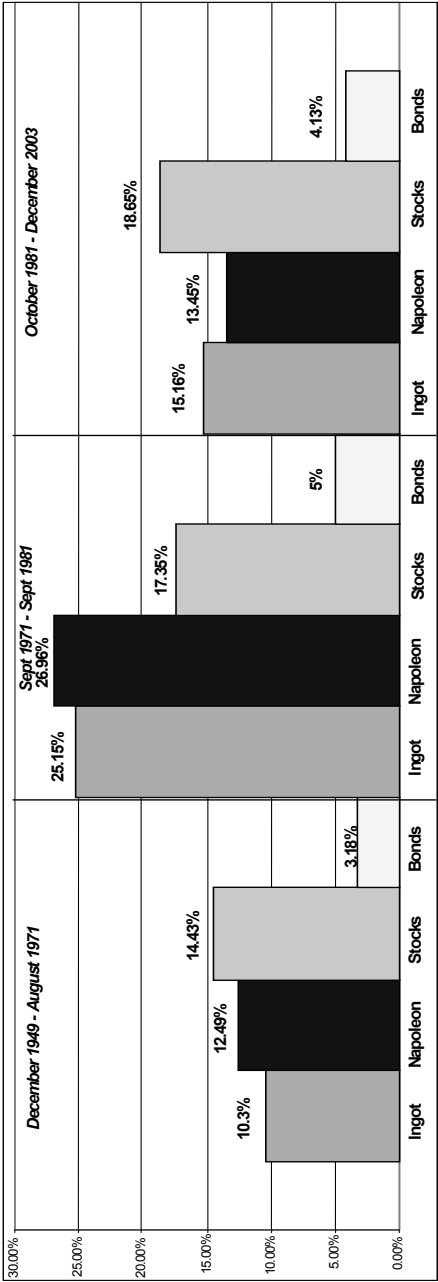
The analysis of Table 6 and Figure 4 complement what has already been seen and said on the three sub-periods.

- Gold return characteristics are confirmed for three sub-periods: a weak return for the first one and a negative return for the third one. The only period when gold is very profitable for French investors is the second one (from September 1971 to September 1981). Its annual rate of return is almost 30%, which is much superior to that of stocks and bonds (about 10% and 12%).
- Gold had also a high level of risk in comparison with stocks and bonds. Its volatility exceeds that of stocks during the second sub-period (26% *versus* 17%).
- Bonds are quite stable in terms of return and risk for the three sub-periods. Their risk is much lower than that of gold (about 4 times lower).
- These assets have not a normal distribution (for all assets and all sub-periods), except the two unusual cases: the stocks returns during the first sub-period (1950-1971) and the bonds returns during the third one (1982-2003).
- The reverse relationship between gold assets and stocks was also noted in the sub-periods. Especially during the second sub-period, this low correlation has been very remarkable (-4% with napoleons and 2.5% with ingots). This confirms a seemingly potential effect diversification.

Figure 4: Nominal risk-return of gold assets, stocks and bonds during the sub-periods



Annualized risk



The negative risk premium of gold assets quoted at the Paris Stock Exchange

Is gold more profitable than a risk-free asset? To answer this question, the monthly rate of money market is used as risk-free asset. Then, the risk premium is calculated by the monthly difference of return between risky assets and the risk-free asset. Table 7 (next page) presents the results in annualized values.

These measures confirm the fact that, over this long fifty-four-year period, the gold assets have had a bad risk-return characteristic since their risk-premium is negative, meaning that gold was even less profitable than the risk-free asset. There was an exception for the 1971-1981 sub-period when the gold assets skyrocketed at the annual rate of about 20%. On the other hand, stocks and bonds returns exceed that of the risk-free asset during the whole period and sub-periods.

Investments in gold at the Paris Stock Exchange: a bad choice for the French investor

The analysis of the risk-return of an asset cannot be complete if the evolution of the consumption prices (or inflation) is not considered. Figure 5 takes into account the inflation rate in the nominal series and the above results are completely changed. There is a wide difference (16 times) between nominal value and real values of indices for all assets.

Although French stocks have had twenty years (1962-1981) of decline, the increase since the Mitterrand's years (in spite of some crashes) had put the *real* index of stocks to 4,300, so a multiplication by 43 (related to the initial amount invested, 100 new francs in December 1949). For the bonds, the *real* multiplication is only 10. But the *real* values of ingots and napoleons are catastrophic: 72 and 56 new francs. As most investors have bought napoleon coins, they have lost about half of their long-term investment.

Table 8 sums up the evolution of the purchasing power of these assets. We consider a capital of 100 new francs invested in December 1949, which was liquidated either at the worst month or at the best one (perfect foresight), or 54 years later at the end of December 2003. What has got the investor in real terms?

Table 7: Annualized monthly risk premium of risky assets quoted at the Paris Stock Exchange during the whole period and the three sub periods (in %)

Assets	Average (<i>in %</i>)	Standard-Deviation (<i>in %</i>)
Total period: 1950-2003		
<i>Gold</i>		
Ingot	-0.52	16.22
Napoleon	-0.91	16.86
<i>Stocks</i>	7.23	16.83
<i>Bonds</i>	3.26	3.90
3 sub-periods		
Sub-period 1: 01/1950-08/1971		
<i>Gold</i>		
Ingot	-2.62	10.30
Napoleon	-1.59	12.53
<i>Stocks</i>	9.26	14.43
<i>Bonds</i>	2.91	3.25
Sub-period 2: 09/1971-09/1981		
<i>Gold</i>		
Ingot	19.82	25.13
Napoleon	21.52	26.89
<i>Stocks</i>	1.08	17.41
<i>Bonds</i>	3.65	5.04
Sub-period 3: 10/1981-12/2003		
<i>Gold</i>		
Ingot	-7.69	15.21
Napoleon	-10.41	13.62
<i>Stocks</i>	8.04	18.64
<i>Bonds</i>	3.42	3.91

Risk premium = difference between the return of a risky asset and the risk-free asset. The computations are made on *monthly* returns. For a better understanding of the values obtained, the results are annualized: annualized average = monthly average*12; annualized standard-deviation = monthly standard-deviation* $\sqrt{12}$.

Figure 5: Evolution of monthly purchasing power (real index) of napoleons, stocks and bonds at the Paris Stock Exchange (base of 100 on December 1949)

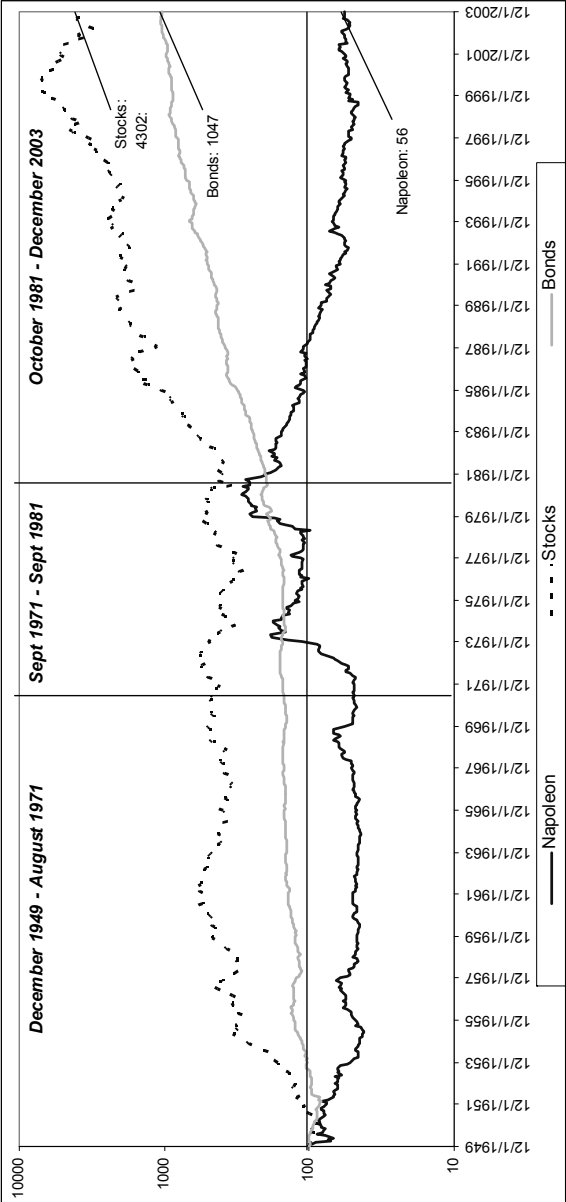


Table 8: Purchasing power of the return indices for stocks and bonds and for gold assets (Capital of 100 invested in December 1949)

	Ingot	Napoleon	Stocks	Bonds
<i>Sale at worst time</i>	February-68	June-60	December-50	February-81
Real value of index	39.7	44.9	81	81
Total rate of return	-60.30%	-55.10%	-19.00%	-19.00%
<i>Sale at best time</i>	September-80	December-80	August-00	May-03
Real value of index	220	295	7421	1067
Total rate of return	120.00%	195.00%	7321.00%	967.00%
<i>Sale at end of 2003</i>	72	56	4302	1047
Total rate of return	-28.00%	-44.00%	4202.00%	947.00%

Table 9: Real annual interest rate of investments in gold assets, stocks and bonds at the Paris Stock Exchange, from December 1949 to December 2003

Real annual interest rate in % (geometric return)				
	1949-2003	1949-1970	1971-1981	1981-2003
Number of years	54	21	11	22
<i>Gold</i>				
<i>Ingot:</i>				
Nominal value	4.69	0.69	24.39	-0.33
Real value	-0.60	-4.15	12.72	-3.35
<i>Napoleon:</i>				
Nominal value	4.21	1.40	25.77	-2.63
Real value	-1.05	-3.48	13.97	-5.59
<i>Stocks</i>				
Nominal value	12.91	13.03	8.56	15.04
Real value	7.21	7.60	-1.63	11.55
<i>Bonds</i>				
Nominal value	10.00	7.01	13.59	11.13
Real value	4.45	1.87	2.93	7.75

Of course, these results have to take into account the length of the investment period. Table 9 below “transforms” these monetary amounts into annual compounded rates of interest for the whole period and sub-periods.

The figures in Table 9 are another way to present the poor results that have already brought to light.

- Column 2 (1949-2004) shows the profitability of an investment in napoleons during these 54 years: the positive nominal rate of interest of 4.21% per year is transformed in a negative -1.05% per year in real terms.
- Of course, this meager situation is reversed during the 1971's decade (column 4), during which the nominal 25.8% per year means a still interesting 12.7% per year in real terms.

Consequently, some conclusions can be advanced here:

- Firstly, the very important effect of inflation on investments. There is a huge difference between nominal and real values. For instance, in the napoleon case, the ended nominal value was 926 while it is only a cheap 56 when inflation is taken into account.
- Secondly, as expected, the returns of each sub-period measured by the geometric mean confirm the results of section 3. The only good period for gold has lasted ten years (1971-1981): 12% per year for ingot and 13% per year for napoleon coins in real term.

Conclusion: the closing of the Paris Stock Exchange Gold Market in July 2004

In July 2004, the gold market at the Paris Stock Exchange was closed. This happened after the decision of *Crédit du Nord*, one of three last institutional members of the gold market, to abandon its market-maker activity. A fixing could not be maintained any more with only two members. So, Euronext Paris announced the end of an official quotation for gold assets on August 2nd, 2004.

The reasons of this closing seem straightforward and are implicitly contained in the results of this study. The basic cause is the disappearance of investors. Although data on trade volumes are very scarce, the two following ones are very emblematic of the situation. In 1981, at the height of the speculation on gold, total trade volume was 6,365 millions of new francs, in 1993 (last year with data), these trades were only 1,957 millions of new francs (so a decrease of 70%).

This behavior of investors is very understandable: why invest in a "poor" asset when the stocks and the bonds are so much profitable, the more so when the stock market is buoyant. Moreover, a high level of tax on the amount of sales amplified this bad risk-return. And the prohibition of import and export with foreign markets limits the arbitrage possibilities.

Finally, one may wonder if the reason of this closing is not deeper than the pure financial reasons just mentioned: does it not reflect a change in the French

mentality¹⁸? With a political, economical and social environment more secure, the new generation of investors seems more interested in risky assets with more potential returns than in the former *mythical safety one*. It seems worth to take the notice that the Kuwait crisis did not have any “increasing” effect on the gold prices. If this hypothesis of a change in psychology were true, really it is a revolutionary turn from two hundred years of myth.

Technically speaking, as a minimum supply and demand for the gold assets does remain (due to the huge amount which French investors are hoarding since the past 200 years), the former leading firm in the market, *CPR Or*¹⁹ (*Compagnie Parisienne de Réescompte Or*), is organizing a private market and still publishes quotes.

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¹⁸ Gallais-Hamonno and Arbulu (1995).

¹⁹ Website: <http://www.cpror.com>.

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Archives of Bank of France

- 1) Verbal proceedings of General Council of Bank of France (from 1945 to 1954).
- 2) Archive documents of the “*Direction Générale des Services Etrangers*” (DGSE) of Bank of France (reference numbers of box: 1467200501, 1463200401 and 1495200501).

Appendix



French coins “*napoléon*”
 Louis-Napoleon Bonaparte



English coins “*sovereign*”
 Elizabeth 2

Appendix 1: Data collected and sources

Series	Period	Sources
Gold Assets		
Monthly price of bar	12/1949-12/2003	Archives of BDF– <i>Cote Officielle</i> –website of CPR Or ²⁰
Monthly price of ingot	12/1949-12/2003	Archives of BDF– <i>Cote Officielle</i> –website of CPR Or
Monthly price of the 20 FF coin, the “ <i>na-poléon</i> ”	12/1949-12/2003	Archives of BDF– <i>Cote officielle</i> –website of CPR Or
Monthly price of the £20 coin, the “sovereign”	12/1949-12/2003	Archives of BDF– <i>Cote Officielle</i> –website of CPR Or
Total quarterly transactions volume (all coins, ingots and bars)	1951-1993	Archives of BDF– <i>Année Boursière</i>
Indices		
Index of French shares, IVFRV and SBF250	12/1949-12/2003	<i>Bulletin Mensuel de Statistique</i> and <i>Datastream</i>
Index of French bonds, IVFRF and index of CNO	12/1949-12/2003	<i>Bulletin Mensuel de Statistique</i> and CNO
Consumption Price Index, CPI	12/1949-12/2003	<i>Annuaire Rétrospectif, 1948-1988</i> and <i>Bulletin Mensuel de Statistique</i>
Monetary market		
Monthly rate of monetary market	12/1949-12/2003	<i>Annuaire Rétrospectif, 1948-1988</i> and <i>Bulletin Mensuel de Statistique</i>

²⁰ CPR Or (*Compagnie Parisienne de Réescompte Or*): Parisian Company of Rediscount, Website: <http://www.cpror.com>. BDF (*Banque de France*): Bank of France – *Cote Officielle*: Official Quote – IVFRV (*Indice des Valeurs Françaises à Revenu Variable*): French index of stocks – IVFRF (*Indice des Valeurs Françaises à Revenu Fixe*): French index of bonds – CNO (*Comité de Normalisation Obligataire*): Committee of Bond Normalization – *Année Boursière*: Stock Market Year – *Bulletin Mensuel de Statistique*: Monthly Bulletin of Statistics – *Annuaire Rétrospectif*: Retrospective Annual.